CLAIMS

What is claimed is:

- 1. A method of investigating a treatment applied to a plurality of cells, the treatment having at least an on-target effect on the plurality of cells, the method comprising:
 - identifying at least an on-target cellular feature or group of on-target cellular features of the plurality of cells, the on-target cellular feature or features being affected by the treatment and being related to the on-target effect;
 - identifying at least an off-target cellular feature or group of off-target cellular features different to the on-target cellular feature or features, which are also affected by the treatment and which are related to a side effect of the treatment; and
 - determining a measure of the side effect based on the off-target cellular feature or features.
- 2. The method as claimed in claim 1, further comprising characterising the treatment based on the measure of the side effect.
- 3. The method as claimed in claim 1, further comprising determining a measure of the on-target effect based on the on-target cellular feature or features.
- 4. The method as claimed in claim 3, further comprising characterising the treatment based on the measure of the on-target effect.
- 5. The method as claimed in claim 4, further comprising characterising the treatment based on the measure of the side effect and the measure of the ontarget effect.
- 6. The method as claimed in claim 1, wherein the off-target cellular feature or features are not related to the on-target effect.
- 7. The method as claimed in claim 1, wherein the measure is a distance in a multivariate space corresponding to the off-target cellular features.
- 8. A method of characterising a treatment that has been applied to a population of cells and that has an on-target effect on the population of cells, comprising:

- identifying from a plurality of cellular features of the population of cells, a first group of cellular features which have been affected by the treatment and which are related to the on-target effect of the treatment;
- identifying from the plurality of cellular features a second group of cellular features which have been affected by the treatment and which are not related to the on-target effect of the treatment;
- creating a first signature characteristic of the on-target effect from the first group of cellular features;
- creating a second signature not characteristic of the on-target effect from the second group of cellular features; and
- evaluating a first measure derived from the first signature and a second measure derived from the second signature to characterise the treatment.
- 9. The method as claimed in claim 8, further comprising:
- determining the separation in multivariate space between the second signature and an origin.
- 10. The method as claimed in claim 9, further comprising:
- determining the separation in multivariate space between the first signature and an origin.
- 11. The method as claimed in claim 9, wherein the origin is provided by a control signature created from a control group of cellular features of a control group of cells, and wherein the control group of cellular features are the same cellular features as the second group of cellular features.
- 12. The method as claimed in claim 10, wherein the origin is provided by a control quantitative signature created from a control group of cellular features of a control group of cells, and wherein the control group of cellular features are the same cellular features as the first group of cellular features.
- 13. A computer program product comprising a machine readable medium on which is provided program instructions for characterising a treatment that has

been applied to a population of cells and that has an on-target effect on the population of cells, the instructions comprising:

- code for identifying from a plurality of cellular features of the population of cells, a first group of features which have been affected by the treatment and which are related to the on-target effect of the treatment;
- code for identifying from the plurality of cellular features a second group of features which have been affected by the stimulus and which are not related to the on-target effect of the treatment;
- code for creating a metric characteristic of the on-target effect from the first group of features;
- code for creating a second metric not characteristic of the on-target effect from the second group of features; and
- code for evaluating the first and second metrics to characterise the treatment.
- 14. A computing device comprising a memory device configured to store at least temporarily program instructions for characterising a stimulus that has been applied to a population of cells and that has an on-target effect on the population of cells, the instructions comprising:
 - code for identifying from a plurality of cellular features of the population of cells, a first group of features which have been affected by the treatment and which are related to the on-target effect of the treatment;
 - code for identifying from the plurality of cellular features a second group of features which have been affected by the treatment and which are not related to the on-target effect of the treatment;
 - code for creating a first metric characteristic of the on-target effect from the first group of features;
 - code for creating a second metric not characteristic of the on-target effect from the second group of features; and
 - code for evaluating the first and second metrics to characterise the treatment.
- 15. A method of characterising a treatment applied to a population of cells, comprising:

- deriving a plurality of cellular features from at least a first captured image of the population of cells that have been exposed to the treatment;
- creating an on-target effect signature, which is characteristic of an on-target effect of the treatment on the population of cells, from at least a first one of the plurality of cellular features, the at least one of the plurality of features relating to cellular properties involved in the on-target effect:
- creating a side effect signature, which is characteristic of a side effect to the on-target effect, from at least a second one of the plurality of cellular features, the second one of the plurality of cellular features relating to cellular properties not being involved in the on-target effect; and
- evaluating an on-target effect metric derived from the on-target effect signature and/or a side effect metric derived from the side effect signature to characterise the treatment.
- 16. The method as claimed in claim 15, wherein the on-target effect signature is created from a group of cellular features.
- 17. The method as claimed in claim 16, wherein the side effect signature is created from a further group of cellular features, in which none of the members of the group of cellular features used to create the on-target effect signature and the members of the further group of cellular features used to created the side effect signature are common.
- 18. The method as claimed in claim 15, wherein the second one of the plurality of cellular features is affected by the treatment.
- 19. The method as claimed in claim 18, further comprising:
 exposing different populations of cells to different doses of the treatment; and
 deriving the on-target effect metric and the side effect metric for different
 doses of the treatment.
- 20. The method as claimed in claim 15, wherein deriving the on-target effect metric or the side effect metric includes determining the difference between

- the on-target effect signature or side effect signature and a control signature from the same cellular features for a control group of cells.
- 21. The method as claimed in claim 15, further comprising:
 capturing at least a first image of a control group of cells; and
 deriving a plurality of cellular features from the image of the control group of
 cells;
 - creating a control on-target signature for the same cellular features for the control group; and
 - creating a control side effect signature for the same cellular features for the control group.
- 22. The method of claim 21, further comprising determining a side effect distance in a multivariate space between the side effect signature and the control side effect signature.
- 23. The method of claim 22, further comprising determining a target effect distance in a multivariate space between the on-target effect signature and the control on-target effect signature.
- 24. The method of claim 23, wherein characterising the stimulus is based on the side effect distance.
- 25. The method of claim 24, wherein characterising the stimulus is based on the on-target effect distance.
- 26. The method as claimed in claim 25, further comprising generating a graphical representation of the side effect distance and on-target effect distance.